



Air Monitoring for Accidental Refinery Releases: Assessment of Existing Capabilities and Potential Improvements

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I. Executive Summary

On August 6, 2012, a major fire occurred at the Chevron refinery located in Richmond, California. As a result of that incident, the Governor's Office created the Interagency Working Group on Refinery Safety to work with local authorities to coordinate refinery compliance and enforcement activities, and improve emergency preparedness in case of future refinery incidents, not just in the Bay Area but also Statewide.

The Air Resources Board is actively involved in the Interagency Working Group on Refinery Safety, including developing this Project Plan that lays out the process and timeline for assessing and improving California's current refinery air monitoring and emergency response system. This document is co-authored by the Air Resources Board and the California Air Pollution Control Officers Association, which represents the local air pollution control agencies. The Plan builds upon the existing emergency preparedness infrastructure established by the California Environmental Protection Agency's Unified Program and the State Emergency Plan.

The Project Plan identifies four key objectives to be met over the next 15 months:

1. October 2013 - Delineate existing air monitoring assets and resources (including modeling and forecasting) and make information available through an online publicly accessible clearinghouse.
2. March 2014 - Evaluate air monitoring capabilities, assess gaps and potential enhancements; make recommendations as needed.
3. June 2014 - Develop Statewide guidance to enhance refinery air monitoring and encourage best practices.
4. September 2014 – Improve interagency coordination, preparedness and training for air emergencies.

This Plan places a strong emphasis on multi-agency cooperation as the key to optimizing emergency services. The Interagency Working Group on Refinery Safety member agencies have committed the resources necessary to pursue refinery safety enhancements. The Air Resources Board and the California Air Pollution Control Officers Association will evaluate and make recommendations on the potential need for additional resources including equipment, services (i.e., laboratory analyses; instrument operations, maintenance, and leasing; modeling and forecasting), staffing, and training, to support local air emergency response programs. This is a critical determination if the

proposed enhancements require upgrades by the Air Resources Board and local air monitoring agencies or require early implementation.

II. Background

On August 6, 2012, a fire occurred at the Chevron refinery in Richmond, California. Many nearby residents sought medical attention for respiratory and eye discomfort after being exposed to the refinery fire emissions. Although the Bay Area Air Quality Management District and other agencies acted quickly to assess the situation and provide public health advisories, the incident highlighted a need to evaluate the adequacy of emergency air monitoring protocols and response plans at both the State and local levels.

In the aftermath of the refinery incident, the Governor's Office directed the Air Resources Board to assess and report on opportunities for working with the local air districts to improve preparedness and response capabilities for emergency air monitoring near refineries and similar facilities, in cases where it is necessary and appropriate. The Air Resources Board surveyed the emergency air monitoring programs of local air districts with jurisdiction over petroleum refineries and, working together through the California Air Pollution Control Officer's Association Air Monitoring Committee, the agencies agreed to work in partnership on this important issue and on the conceptual framework for this Plan.

III. Overview

In response to the August 6 Richmond refinery fire, the Bay Area Air Quality Management District (District) executed an emergency plan in concert with Contra Costa County emergency officials. On-call staff collected air samples using specialized sampling canisters sited at strategically determined locations throughout the East Bay. In addition, criteria pollutant, non-criteria pollutant, and meteorological data from the District's existing network of fixed ambient air monitoring sites were retrieved, evaluated, and shared. The District prioritized sample analyses and provided the data to other local authorities and the public as soon as it was available. After the incident, the District's governing Board adopted a refinery-focused work plan to evaluate their operations. As part of that work plan, Desert Research Institute, a private contractor, was hired to evaluate the data generated, its usefulness, and what could be done to improve air monitoring following future accidental refinery releases. The initial findings of the evaluation were released in July 2013.

Working with District staff, as well as other air monitoring agencies, the Air Resources Board identified five specific recommendations for improving the response of air quality agencies to future accidental refinery releases. First, incident command decisions require real or near real-time air monitoring data (i.e., data that is accurate, reliable and timely to the decision-making process) to assist public health and emergency

responders. Second, meteorological forecasts and atmospheric modeling of air dispersion and release plume dynamics are valuable tools for assessing and mitigating public health exposures. The Air Resources Board and many local air districts have this expertise and ability. Third, response plans that clearly define protocols and procedures prior to, during, and after an incident need to be available to appropriate responders. These plans need to be exercised cooperatively with multiple agencies to ensure understanding and readiness for future incidents. Fourth, public communication plans are necessary to coordinate unified communications between subject matter experts and public information officers. Plans should anticipate questions and concerns from the affected community, and be used by responding agencies to ensure a consistent and coordinated communication plan. Finally, notifications to neighboring jurisdictions and coordinating State agencies can often yield valuable assistance and additional resources. Better coordination between federal, State, and local agencies can bring more resources to bear to better informing local regulators and responders.

This Project Plan incorporates these key areas into its objectives and tasks to evaluate processes and develop best practices cooperatively with local agencies. As a member of the Interagency Working Group on Refinery Safety, the Air Resources Board has taken a proactive role and completed several near term, high-priority tasks to provide emergency management officials and the public with timely air monitoring information. Staff has developed an online publicly accessible clearinghouse that provides easy access to air monitoring information relevant to California refineries. The Air Resources Board has worked with local districts to compile and present preliminary Statewide information. A preliminary characterization of major refineries and the existing nearby air monitoring stations has been conducted and maps highlighting this information have been prepared (Appendix A). Finally, contact information on the air monitoring agency liaisons (Appendix B) has been compiled. Section VIII. provides a comprehensive description of the Plan's objectives and tasks.

IV. State Response Framework

California has a well-established framework for interactive collaboration between the State and local emergency response entities before, during, and after emergency incidents. This Project Plan for air monitoring of accidental refinery releases is consistent with existing statutory and regulatory programs, including the Standardized Emergency Management System and the State Emergency Plan. The California Office of Emergency Services is charged with the overall coordination of preparedness and response to those large, local and regional disasters that warrant State intervention and support.

The California Environmental Protection Agency has two important statutory authorities that support this plan for ensuring preparedness for future refinery releases. First, the California Environmental Protection Agency is the lead State agency for preparedness for oil spills and hazardous material releases, including industrial fires, under the State Emergency Plan. In accordance with the design of the State Emergency Plan, the

guidance documents developed as a result of this Plan will be incorporated into the State Emergency Plan's Annex for Oil Spills and Hazardous Materials - Emergency Function 10.

Second, the agency has executive and oversight authority for the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program, also known simply as the Unified Program, which oversees 83 local government agencies certified by the Secretary to implement the program. These certified local agencies are called Certified Unified Program Agencies. The Unified Program consolidates six statutory programs, including four that contain emergency planning and preparedness elements (e.g., chemical inventories, risk assessments, worst-case scenarios, and off-site consequence analyses) that are directly applicable to releases of hazardous air contaminants. These programs can and should provide information useful to local air pollution control districts during emergencies. The off-site consequences and worst case scenario analyses of the California Accidental Release Prevention program are specifically designed to address the risks of airborne releases of chemicals from stationary sources across California. In concert, these four programs protect the public health from accidental releases of hazardous materials and are summarized as follows.

1. Business Plan Program

The Business Plan Program is designed to prevent or minimize releases or threatened releases of hazardous materials. This is accomplished by requiring businesses that handle hazardous substances above a threshold quantity to:

- a. Inventory their hazardous materials,
- b. Develop a site map and emergency plan, and
- c. Implement a training program for employees.

Businesses must submit this information to their local Certified Unified Program Agencies. The Certified Unified Program Agencies verify the information and provide it to agencies responsible for the protection of public health and safety and the environment. These agencies may include:

- a. Fire departments,
- b. Hazardous materials response teams, and
- c. Local environmental regulatory groups (e.g., Tahoe Regional Planning Agency).

The public also has a right to review some of this information. However, the release of confidential and trade secret information to the public is limited by State and federal law, for sensitive chemical security reasons. Information is available as necessary to satisfy community right-to-know laws and facilitate local land use decisions.

2. California Fire Code Hazardous Material Management Plan and Hazardous Material Inventory Statement

The hazard disclosure requirements of the California Fire Code for managing the release of a hazardous material are satisfied by the Business Plan Program, when it is approved by the Certified Unified Program Agencies.

3. Area Plan Program

The Area Plan Program is a planning tool for local government agencies to respond to, and minimize the impacts from a release or threatened release of a hazardous material. It requires local Certified Unified Program Agencies to create an Area Plan that:

- a. Identifies the area-wide hazardous materials which pose a threat to the community,
- b. Develops procedures and protocols for emergency response,
- c. Provides for notification and coordination of emergency response personnel,
- d. Provides for public safety including notification and evacuation,
- e. Establishes training for emergency response personnel,
- f. Identifies available emergency response supplies and equipment, and
- g. Provides for the critique and follow-up after a major incident.

The Area Plans must include provisions for multi-agency notification, coordination, and emergency response. These agencies may include law enforcement, fire services, medical and public health services, poison control centers, and care and shelter services.

4. California Accidental Release Prevention Program

The California Accidental Release Prevention program is designed to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases do occur, and to satisfy community right-to-know laws while protecting sensitive chemical security information. This is accomplished by requiring businesses that handle more than a threshold quantity of a regulated substance listed in the regulations to develop a risk management plan. A risk management plan is a detailed engineering analysis of the potential accident factors present at a business, and the mitigation measures that can be implemented to reduce this accident potential. The risk management plan contains:

- a. Safety information,
- b. A hazard review (including offsite consequence analysis and worst-case scenario),
- c. Operating procedures,
- d. Training requirements,
- e. Maintenance requirements,
- f. Compliance audits, and

g. Incident investigation procedures.

The California Accidental Release Prevention program is implemented at the local level by the local Certified Unified Program Agencies. The program is designed so these agencies work directly with the regulated businesses. The Certified Unified Program Agencies determine the level of detail in the risk management plans, review the risk management plans, conduct facility inspections, and provide public access to most of the information. Confidential or trade secret information may be restricted.

The Certified Unified Program Agencies use information collected from the Business Plan and the California Accidental Release Prevention program to identify hazardous materials in their communities. This information provides the basis for the Area Plan, and is used to determine the appropriate level of emergency planning necessary to respond to a release.

The Certified Unified Program Agency programs described above are designed to provide State oversight while fostering effective emergency prevention, preparedness, and response at the local level for environmental contamination incidents. The California Environmental Protection Agency's subordinate boards, departments, and offices are responsible for providing support during these environmental emergencies under the California Emergency Services Act, several administrative orders, executive orders, and the State Emergency Plan. The Air Resources Board supports local air districts, local public health and environmental health departments, and other agencies during air quality emergency events.

The Air Resources Board formally established its Office of Emergency Response in 2009. The Office of Emergency Response deploys air monitoring instruments and resources during air contamination emergencies, plans and directs the support functions of a Board-wide emergency response team, and oversees participation in Agency-wide and Statewide emergency air monitoring preparedness activities.

As dictated by need, the Office of Emergency Response collaborates with expert staff from the Monitoring and Laboratory Division (instrument support and analytical services), Air Quality Planning and Science Division (meteorology, atmospheric modeling, and emission inventory functions), Research Division (health risk assessment), and the Chairman's Office of Public Affairs (public communication and advisories).

The Office of Emergency Response develops and maintains internal response protocols within the fundamental framework of the Standardized Emergency Management System and its formal Incident Command System, making response actions and procedures congruent with regional, state, and national response actions.

Appendix C provides a more comprehensive description of the group's responsibilities, capabilities, and response protocols.

V. Federal Response Framework

There are two principal federal programs designed to enable state and local governments to prepare for, and effectively respond to, hazardous releases to the environment.

The Emergency Planning and Community Right-to-Know Act (1986) and its subordinate regulations require facility owners and operators to prepare and submit inventories of their hazardous chemicals and emergency release contingency plans to designated state and local emergency officials. These requirements are fully achieved in California through compliance with the analogous state programs described in detail above.

The National Response System/National Contingency Plan framework provides a comprehensive response back-up system to augment state resources during environmental emergencies, including unplanned air releases. The federal response program makes available extensive training resources; on-site coordinators; communication and reporting systems; and field monitoring (including air), response, and clean-up management teams for major incidents where federal support and intervention is needed. The Air Resources Board and the California Environmental Protection Agency work very closely with the United States Environmental Protection Agency in developing synergistic uses of resources, and expect valuable input in the execution of this plan.

VI. Local Air District Response Plans

There are seventeen oil refineries operating in four local air districts within the State.¹ The local air districts include the Bay Area Air Quality Management District, South Coast Air Quality Management District, San Joaquin Valley Air Pollution Control District, and San Luis Obispo Air Pollution Control District. Figure 1 is a map of the California refineries and Table 1 lists the refineries in each local air district.

¹ For purposes of this project plan, a refinery is defined as a facility with a crude oil throughput capacity of 10,000 barrels per day or more, as identified by the California Energy Commission. Several smaller facilities operate within the air quality jurisdictions participating in this project, and so will be subject to resulting emergency planning improvements.

Figure 1. Map of California Refineries



Table 1. California Refineries

Bay Area Air Quality Management District	Chevron Richmond Tesoro Rodeo Shell Martinez Valero Benicia Phillips 66 Rodeo
South Coast Air Quality Management District	Chevron El Segundo ExxonMobil Torrance Phillips 66 Wilmington Tesoro Wilmington Valero-Ultramar Wilmington Paramount Oil Paramount Tesoro Carson Edgington Oil Long Beach
San Joaquin Valley Air Pollution Control District	ALON Bakersfield Kern Oil Bakersfield San Joaquin Oil Bakersfield
San Luis Obispo Air Pollution Control District	Phillips 66 Santa Maria

As described above, industrial plants and refineries that maintain a threshold quantity of a toxic material onsite must prepare and submit detailed accidental release plans to their local Certified Unified Program Agencies. These accidental release plans provide valuable information on hazardous material inventories, process engineering specifications, off-site consequence analyses for plant releases, and emergency response plans that are coordinated with local responders. Each of the four California local air districts with regulatory authority over petroleum refineries has access to the local Certified Unified Program Agency release contingency and response plans.

In addition to having access to these emergency plans, three of the four local air districts have developed or are developing internal emergency response plans to address their specific roles, responsibilities, and procedures for obtaining and disseminating emergency monitoring data. The Air Resources Board is working collaboratively with each District to produce Statewide guidance that will be useful in air release emergency planning and coordination for refineries and other major sources.

Following is a summary of each District's emergency response procedures and their current, related activities:

Bay Area Air Quality Management District

The Bay Area Air Quality Management District has incident response policies and procedures designed to provide information and support to first responders and other incident response agencies. The District works with these agencies to develop methodologies to foster efficient and effective interaction and communication when the District participates in incident response activities. The District is reviewing and updating its incident response policy and procedures as one part of a seven point action

plan in response to the August 6, 2012 fire at the Chevron Refinery in Richmond, California. The remaining six action items of the plan include:

- working with other agencies to investigate the incident and take appropriate enforcement actions,
- evaluating enhancements to current air monitoring capabilities, including collaboration with outside monitoring experts,
- expediting development of a rule to track total refinery emissions and require mitigation of significant increases, along with inclusion of additional air monitoring,
- evaluating incident response resources and recovery of associated costs,
- evaluating enhancements to communication strategies, and
- sponsoring legislation to collect higher penalties.

Incident Response Program

There are five refineries located in the Bay Area. Four refineries, Chevron, Shell, Tesoro and Phillips 66, are located in Contra Costa County while one, Valero, is located in Solano County. For the refineries located in Contra Costa County, the Bay Area Air Quality Management District utilizes a notification system developed by the County that provides alerts to Compliance and Enforcement staff when any air contaminant release, regardless of size, occurs. The Valero Refinery in Solano County utilizes a system based on the Contra Costa County model. Both notification systems use a rating procedure that is based on the potential impacts allowing Compliance and Enforcement staff to determine if further investigation and/or actions are required.

Other types of incident response activities not necessarily associated with refineries, such as responding to wildfires, are generally initiated upon receipt of a request for technical assistance from a recognized first response or governmental health agency such as local police, fire departments, health departments, or California Environmental Protection Agency. The District may also initiate an incident response based on direct observations, referrals from other agencies, company's notifications, news media reports and air pollution complaints from the public.

As provided by various state laws, incident response agencies including the California Highway Patrol, Sheriff, local police, or local fire agencies, have the primary responsibility for scene management during an unintended release or emergency incident. The Bay Area Air Quality Management District is not an incident response agency, but contributes in an advisory or support capacity, utilizing District resources and expertise for air sample collection, air monitoring, meteorology, laboratory analysis, inspection and communications support. The District's Compliance and Enforcement staff make every effort to be at the Incident Command Center to provide assistance unless it is not practical, deferring to the primary response agency.

The Compliance and Enforcement staff is on scheduled standby duty requiring that they are always available to respond to an incident upon request. It is a goal of the District to respond to an incident as soon as possible. Procedures specify that appropriate staff, such as public information officers or monitoring and laboratory staff, also be alerted in

the event that additional resources are needed. The safety and well-being of all District staff members take precedent at all times.

Facility Information

When an incident involves a facility or operation that holds permit(s) from the District, the Compliance and Enforcement staff will provide relevant information to the Incident Command regarding the nature of the facility. In addition, any other potential sources of hazardous material which may be affected by the incident will be identified. Compliance and Enforcement also conducts an investigation of the incident to determine if any air pollution regulations or permit conditions have been violated as a result of the air contaminant release.

Sampling and Monitoring Capabilities

The District provides specialized technical support within the Incident Command System, and can assess the atmospheric concentration of specific air pollutants through the District's air monitoring network, the use of mobile instrumentation or the collection of additional air samples for subsequent laboratory analysis, if requested. Specific monitoring and sampling needs (e.g. sampling protocol and frequency, sampling media and/or instrumentation type) are evaluated on a case-by-case basis depending on requirements of the Incident Command or on-scene Compliance and Enforcement staff.

The District currently utilizes a wide range of monitor/test equipment capable of measuring gaseous and particle air pollutants that can be brought to bear to supplement the existing District ambient air monitoring network. In addition, the District is evaluating additional air monitoring resources that will better define community exposures near refineries and provide further information during incidents as part of the seven point action plan, discussed earlier. Current monitoring capabilities include:

- Forward-looking infrared cameras to visually identify emissions of volatile organic compounds. Major leaks of hazardous organic gases are displayed as a vapor plume in an infra-red image, showing emissions that are invisible to the eye. These cameras can be used to reduce emissions, and help facilitate changes in operating procedures.
- Specially treated stainless steel canisters to collect air samples over a short period of time, usually less than one minute ("grab" samples). Prior to sampling, the canister is evacuated and air is then let into the canister by opening a valve. Once a sample is collected, the canister is brought back to the District laboratory for volatile organic compound analysis.
- Integrated filter samples can also be collected and analyzed by the District laboratory for asbestos, trace metals and other specific particulate matter components.
- Various real-time or near real-time instruments for the measurements of ultrafine, fine and coarse particulate matter, hydrogen sulfide and hydrocarbons.
- A mobile measurement van is located in the vicinity of the refineries and can be deployed as quickly as possible. The van has canister sampling capabilities, real-time hydrogen sulfide and sulfur dioxide instrumentation. The District is currently

investigating additional capabilities and enhancements for this van and further utilization of other mobile platforms currently in use for other testing purposes.

Results of air quality assessments during incident response activities are made available to the Incident Command and public health authorities as soon as they are available. Results can also be disseminated to the public via e-mail list-serves, issuance of public advisories, press releases, and media interviews.

Additional Rule Making

The Bay Area Air Quality Management District staff is developing a new rule applicable to all five refineries in the Bay Area that would track changes in the facility's overall air emissions, including those related to unintended releases. Increases in air emissions at the facility above baseline levels would require an analysis of the cause of the emissions increase, which may include various factors such as increases in production levels or declining crude oil quality. In addition, any increases in emissions above specified trigger levels would also require preparation and implementation of an emissions reduction plan. The new rule would also require additional monitoring at the refinery fence-line and in the nearby community. Many aspects of the proposed rule would be patterned after the District's highly successful rule adopted in 2005 to minimize emissions from flares at refineries.

South Coast Air Quality Management District

The South Coast Air Quality Management District Governing Board first adopted its policy on airborne hazardous materials incidents response in 1985. This emergency response policy and associated response procedures have undergone various reviews and revisions, the most recent in June 2010. The District is currently reviewing its emergency response program in the wake of the Richmond refinery fire to ensure that lessons learned from that incident are incorporated into its policy and procedures.

Emergency Response Program

Emergency response activities are generally initiated upon receipt of a request for technical assistance from a recognized first response or governmental health agency such as local police, fire departments, health departments, or California Environmental Protection Agency. The South Coast Air Quality Management District's emergency response program is not intended to act as a first responder agency but instead to serve in a technical support capacity to the lead on-scene agency and Incident Command.

The primary method to request support from the District's emergency response team is by use of the 1-800-CUT-SMOG complaint line, which operates 24 hours per day. Air quality complaints are also received at this toll-free number or via the District's on-line complaint system. Note that emergency response can also be initiated in response to a sudden increase in similar, geographically concentrated complaints. Response may also be initiated by the Executive Officer when such action would be in the best interest of the public or there is good cause to believe that there are immediate air pollution impacts from an emergency situation.

The South Coast Air Quality Management District emergency response team responds to emergencies such as fires, explosions, toxic spills and toxic gas releases at industrial or commercial facilities and other sources. All emergency response team members receive 40-hour environmental health and safety training (commonly known as HAZWOPER training), as well as a 40-hour first responder certification. They are required to attend annual refresher classes to maintain these certifications. The District also dispatches its emergency response team to events with potential significant public air quality impacts such as wild land fires.

Critical to the District's ability to expeditiously respond to emergency incidents and provide the necessary technical support, scheduling, and staff availability is the requirement that emergency response team members are available at all times on a standby rotational basis. Emergency response team members are on scheduled standby duty requiring that they are always available by land line phone or cell phone and available to readily respond to an incident upon request. It is a goal of the emergency response team to respond to an incident as soon as possible. The safety and well-being of all emergency response team members take precedence at all times. The South Coast Air Quality Management District does not under any circumstances assume primary incident command responsibilities during emergencies.

Facility Information

When an emergency response incident involves a District-permitted facility or operation, the emergency response team will provide relevant information regarding the nature of the facility and may conduct an investigation of the incident to determine if any air pollution regulations or permit conditions have been violated as a result of the airborne hazardous material release. In addition, the emergency response team will identify any other potential sources of hazardous material which may be affected by the incident.

Sampling and Monitoring Capabilities

The emergency response team provides specialized technical support within the Incident Command System, and is responsible for assessing the atmospheric concentration of specific air pollutants and the collection of air samples for subsequent laboratory analysis. Specific monitoring and sampling needs (e.g. sampling protocol and frequency, sampling media and/or instrumentation type) are evaluated on a case-by-case basis depending on information provided by the first response agency Incident Commander or the emergency response team. Meteorological data is also collected on-site by the emergency response team and used for data interpretation and analysis. The District also has computer modeling capabilities to predict how pollutants will disperse in a community.

To supplement the existing monitoring network, the District emergency response team can monitor/test for a wide range of gaseous and particle air pollutants using state-of-the-art equipment including:

- Forward-looking infrared cameras to visually identify emissions of volatile organic compounds. Major leaks of hazardous organic gases are displayed as a vapor fume

in an infra-red image, showing emissions that are invisible to the eye. These cameras can be used to reduce emissions, enforce existing regulations and help facilitate changes in operating procedures,

- Stainless steel canisters to collect air samples over a short period of time, usually less than one minute (“grab” samples). Prior to sampling, the canister is evacuated and air is then let into the canister by opening a valve. Once a sample is collected, the canister is brought back to the District laboratory for volatile organic compound analysis,
- Integrated filter samples can also be collected and analyzed by the District laboratory for asbestos, trace metals and other specific particulate matter components,
- Various real-time or near real-time instruments for measurement of ultrafine, fine and coarse particulate matter, hydrogen sulfide, black carbon (a surrogate for diesel particulates), and speciated volatile organic compounds (via portable gas chromatography/mass spectroscopy)
- Two mobile measurement stations each comprised of a 14-foot dual axle trailer equipped with a wide array of air quality measurement instruments can be deployed in the field within hours. It should be noted that each mobile measurement station is equipped with a non-methane hydrocarbon monitor that continuously measures methane and non-methane hydrocarbon levels. This, in conjunction with a multi-canister sampling system, allows for triggering the collection of canister samples for subsequent laboratory analysis when non methane hydrocarbons exceed a threshold.

The South Coast Air Quality Management District is currently evaluating the performance of three remote sensing technologies for monitoring fugitive emissions from refineries. These three technologies are based on ultraviolet-visible differential optical absorption spectroscopy. Specifically,

1. Long-path differential optical absorption spectroscopy: this system monitors aromatic hydrocarbons at a fence line and can be used as an alarm tool for accidental emissions,
2. Imaging differential optical absorption spectroscopy: this system remotely measures emissions such as formaldehyde, nitrogen dioxide, and sulfur dioxide from point sources,
3. Dual multi-axis differential optical absorption spectroscopy: this system is used for facility wide emission fluxes for pollutants such as formaldehyde, nitrogen dioxide, and sulfur dioxide.

These open-path measurement technologies can be used to alert local communities in case of high level of emissions and upset conditions from a refinery. The District is also continually assessing the recent emergence of low-cost sensor technology for refinery monitoring applications.

Community Notification Systems & Flare Events

Results of air quality assessments during emergency response activities are made available to the Incident Command and public health authorities as soon as they are available. Results are also disseminated to the public via e-mail list-serves, issuance of public advisories, press releases, and media interviews.

To share information regarding flare events at petroleum refineries, sulfur recovery plants and hydrogen production plants, the District offers on-line subscribers the opportunity to receive e-mail notification and related information about these events. Those facilities participating in the District's flare event information and notification service first notify one or more public agencies as appropriate, including the District, when an event occurs or is expected to occur. The classification of the event determines the type of notification provided, not only to the affected agencies, but also to the public. Facilities reporting flaring events are required to notify the South Coast Air Quality Management District 24 hours prior to the start of a planned flare event or, in the event of an unplanned flare event, notify the District within one hour after the start of the incident.

Seven petroleum refining facilities (at eight locations), three hydrogen plants and one sulfur recovery plant within the South Bay region of Los Angeles County operate a combined total of 30 flares subject to the requirements of the South Coast Air Quality Management District Rule 1118 - Control of Emissions from Refinery Flares. The District requires facilities operating flares subject to Rule 1118 to provide telephone access 24 hours a day to answer questions and provide information about planned and unplanned flare events to the public. Air quality complaints are reported to the District via the 1-800-CUT-SMOG complaint line or on-line at www.aqmd.gov.

San Joaquin Valley Air Pollution Control District

Although the refineries located within the San Joaquin Valley Air Basin are much smaller and located in less densely populated areas than refineries in the South Coast or Bay Area, the San Joaquin Valley Air Pollution Control District and refinery operators have invested significant resources in monitoring these operations and ensuring the safety of the public. District refineries are subject to extensive monitoring and reporting requirements related to flaring and other activities, and these requirements are enforced through the District's permitting and enforcement programs

District Rule 4311 - Flares and Rule 4455 - Components at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants; require the submittal of flare minimization and operator management plans and extensive monitoring of equipment and components. Under these rules, annual reports and inspection logs must outline activities including reportable flaring events, total volumetric flow of vent gas for each day, and the total number of components inspected. Additionally, flares located at a refinery are subject to vent gas composition monitoring, pilot and purge gas monitoring, and video monitoring that requires the installation and maintenance of equipment that records a real-time digital image of the flare and flame at a frame rate of no less than one frame per minute or other equivalent monitoring.

Through the District's Rule 2201 - New Source Review, refinery operators must obtain air permits from the District before modifying, constructing, or operating equipment that emits air pollution. The requirements that must be met to obtain a permit in the Valley are among the strictest in the nation, requiring the best available air pollution control equipment and mitigation of emissions increases. The District also routinely conducts detailed inspections and audits of equipment at refineries and monitors emissions from facilities using a variety of methods including vans outfitted with specialized monitoring equipment, hand-held portable emissions analyzers and leak detectors, and staff certified to read visible emissions. With these mature permitting and enforcement programs, the District ensures that the Valley's refineries comply with applicable federal, state and local regulations.

In case of major disasters/emergencies such as fires, explosions, toxic spills and toxic gas releases at agricultural, industrial, commercial, or other facilities, the District has an internal emergency communications plan and associated response protocol to contact proper agencies throughout the state and within the eight counties located in the air basin. The District's emergency response program includes: 1) an emergency communications team consisting of key staff who can respond quickly to an incident, 2) a comprehensive emergency communications plan describing notification procedures and technical resources, and 3) an emergency communications policy and checklist to aid in efficient responses; including requirements for an on-going, periodic review of the emergency response documents.

The District's emergency communications team is not intended to act as a first responder and will not assume the lead during an emergency situation; rather it acts as in a technical support capacity assisting the State's California Office of Emergency Services, California Environmental Protection Agency and local agencies such as police, fire departments, and other health agencies to help determine the air quality impacts associated with an incident. The District, with the Air Resources Board's assistance, maintains a robust air monitoring network that is comprised of 36 strategically located air monitoring stations. Using information from these monitoring stations, real-time information is provided to the public through the District's real time air advisory network. The District has capabilities to deploy monitoring equipment and conduct incident specific monitoring and sampling on a case-by-case basis. The District also has computer modeling capabilities to predict how pollutants will disperse in a community. Utilizing the above tools, the District can assist the lead agencies during an emergency to assess potential air quality impacts. These assessments can be disseminated to the public via email list-serves, issuance of public advisories, press releases, and media interviews.

The District appreciates the efforts the Air Resources Board has taken in the important work being conducted through the Interagency Working Group on Refinery Safety. Since the Air Resources Board is seeking to address the full range of refinery operations in the state, including small rural refineries, the District appreciates the opportunity to be a key participant in this effort and looks forward to ensure that lessons

learned from recent events are incorporated into the existing significant resources that the district has already invested into monitoring these operations.

San Luis Obispo Air Pollution Control District

The San Luis Obispo Air Pollution Control District has an internal emergency response program and procedures in place that dovetail with the San Luis Obispo County-wide emergency response plan for environmental releases and major disasters. The County-wide plan conforms to the State emergency response framework described previously. The district's program includes: 1) an emergency response team, 2) a plan describing resources and authorities, 3) a concise six-page response procedure, and 4) a provision for periodic update by a steering committee.

Emergency Response Program

At the request of local police, fire and health departments, the San Luis Obispo Air Pollution Control District assists these agencies in emergencies such as fires, explosions, toxic spills and toxic gas releases at industrial and commercial facilities and other sources. The District also dispatches its emergency response team to assist at events with significant public air quality impacts. Although the District staff is not a "first response" agency, in the case where District inspection and complaint investigation activities have noted releases of hazardous air pollutants, the District staff will immediately contact emergency services. The District's responsibilities in emergency response include: 1) monitoring and evaluating the consequences of substances that have been or could be released to the atmosphere, and 2) to communicate and coordinate information with the County Health Department, including the Health Agency Administrator and Environmental Health section. Within the standardized Incident Command System, the District provides staffing as technical specialist, agency liaison and/or recovery group assistance. The District also provides meteorological data and analytical services

The San Luis Obispo Air Pollution Control District Emergency Response Plan is designed and written to assist the District's management, employees and outside responding agencies through emergency response actions involving air quality emergencies or near emergencies. The purpose of the Emergency Response Plan is to establish structure for emergency response within the boundaries of the District's authority and implement the District Health Advisory Policy and Procedure to help manage air quality emergencies or near emergencies, referred to as "health advisory episodes".

The District's emergency response team is committed to serving the public before, during and after times of air quality emergencies. The Air Pollution Control Officer and the District's Public Information Officer are also emergency response team members. The team has a coordinator, usually the District compliance and monitoring manager. Emergency response team training is focused on 40-hour environmental health and safety training, as well as 40-hour first responder certification and/or federal Incident Command System ICS 100 and 200 series certification. The District staff assigned to the Unified Dose Assessment Center for Diablo Canyon Nuclear Power Plant

emergencies are a subset of the emergency response team and have highly specialized training, roles and responsibilities. The County and involved agencies maintain a separate emergency response plan document for Diablo Canyon Nuclear Power Plant.

Facility Information

The San Luis Obispo Air Pollution Control District staff uses its knowledge of source operations at permitted facilities, permit files, emission inventory and risk management plans that contain chemical storage, handling and use information, in their support efforts during emergency response.

Sampling and Monitoring Capabilities

The San Luis Obispo Air Pollution Control District monitoring station network can monitor wind speed and direction and provide meteorology guidance for consultation and analysis. Data from the three stations nearest the Santa Maria refinery facility includes information on particulate, sulfur dioxide, ozone, and nitrogen dioxide. The District works with public safety agencies and the Air Resources Board if needed to model predictions of how pollutants will disperse in a community. In addition, District's emergency response team members can provide technical help collecting ambient air samples near emergency sites and return them to a contract laboratory for analysis. The District is prepared to supply emergency workers or fire departments with equipment for sampling in close proximity to emergency incidents.

The District's contract laboratory can test for a wide range of constituents such as hydrocarbons, particulates, asbestos, metals and specific carcinogens such as benzene. Lab analyses typically take a few hours to complete, but in some cases may take several days or more. The District can directly measure some pollutants such as hydrogen sulfide, hydrocarbons and particulate matter.

Community Notification and Public Information

During health advisory episodes, the Air Pollution Control Officer serves as the District's public information Officer, assisted by and the District management team. Results of District monitoring are disseminated to the public via website, phone messaging systems messages such as reverse 911, public advisories, press releases and media interviews. Data for media, source and public information is always channeled through the Incident Command System-designated public information officer during incidents involving the Incident Command System.

The Santa Maria refinery facility notifies the District regarding any flaring and upsets immediately. Information is also disseminated to close-by neighborhoods through the Citizen's Advisory Notice. Turnaround activities are planned with the District to minimize flaring and odorous emissions. During flaring, upset and turnarounds events the District is focused on tracking complaints and monitoring data.

VII. Emergency Air Monitoring Objectives and Project Tasks

This section summarizes objectives and tasks that the Air Resources Board and local air districts have identified to assess opportunities for improvement of air monitoring systems of refineries and local agencies (i.e., local air districts, public health officers, environmental health departments, first responders, and institutions). Improvements will benefit the State's emergency response and ambient air monitoring programs.

The plan consists of four objectives that will accurately characterize and assess existing resources as well as provide district-by-district recommendations on preparedness and response enhancements. Additionally, the plan includes the development of Statewide guidance for preparedness in the event of refinery incidents and for facilitating improved, ongoing collaboration between the local air districts, the State, the local emergency response agencies, and refineries. Appendix D provides a timeline for completion of individual tasks and each objective overall.

1. Objective - Delineate Existing Air Monitoring Capabilities and Make Information Easily Accessible

To develop local and Statewide guidance on potential modifications and improvements to emergency air monitoring plans, the Air Resources Board and each local air district need to first clearly identify current monitoring protocols, methods, and capabilities individually and jointly as complementary programs. This objective is focused on the physical monitoring systems, the trained staff resources available, the methods for equipment deployment and use for local emergency air monitoring, and making information easily accessible to emergency management officials and the public. The objective will include information from refineries, as well as State and local agencies (i.e., local air districts, public health officers, environmental health departments and first responders). The information gathered will include instrument types (principle of operation, operating protocols, data reduction and interpretation, and operational limits), instrument location, and pollutants measured and sampling frequency. Equally important is to determine ease of access to collected data and its use in public notification and communication with local responders. This objective is planned to be completed in October 2013.

- a. Summarize State and local ambient air quality monitoring network information (Appendix A).
 - Identify refineries and adjacent ambient air quality monitoring network operations.
 - Identify local air district points of contact for emergency monitoring (Appendix B).
- b. Identify other key points of contact with capabilities and assets for emergency response.
 - Secure local air district support for proposed project plan.
 - Identify and contact local air district emergency team.
 - Identify any contractors used for air monitoring.

- Identify any institutional air monitoring resources.
- Identify local emergency responders and air monitoring capabilities.
- c. Develop mechanisms to provide emergency management officials and the public with timely information on refinery-related air monitoring issues.
 - Create an online publicly accessible clearinghouse to disseminate information.
 - Investigate the feasibility of deploying emerging monitoring technologies near refineries.
 - Provide links to important resources and documents, including web-based technologies for interoperable emergency data communication.
 - Provide tools for communicating training, best practices, and guidance.
- d. Conduct a collaborative inventory of existing air monitoring capabilities of local emergency authorities.
 - Review air monitoring capabilities, assets, and resources (including modeling and forecasting) of local air districts, local agencies, private industry, and institutions.
 - Issue a report on the identification of local monitoring capabilities and develop a mechanism for ongoing tracking of progress toward completion of project plan objectives and tasks.

2. Objective - Evaluate Air Monitoring Capabilities, Assess Gaps and Potential Enhancements

Once an inventory of the existing monitoring capabilities is completed (Objective 1), the Air Resources Board and each local air district will jointly evaluate monitoring objectives and assets, assess potential critical gaps based on the lessons learned from the Bay Area Air Quality Management District process and develop recommendations for air monitoring enhancements, including the need for new resources. This objective will require and benefit from the support of agencies and institutions employing multidisciplinary expert teams on their staff (toxicologists, meteorologists, modelers, instrumentation experts and experienced responders). This objective is planned to be completed in March 2014.

- a. Evaluate the applicable protocols and procedures for emergency response identified under Objective 1 as described above. This will include equipment, inter-agency agreements, deployment plans, and training.
 - Identify and establish evaluation criteria and tools to provide a consistent framework for this evaluation of capabilities and share with local air districts for review.
 - Review local air districts' emergency monitoring protocols and procedures (field instrumentation, forecasting/modeling, laboratory, etc.).
 - Review the documentation and resources of other responding agencies (Certified Unified Program Agency plans and other emergency response protocols and procedures) and identify areas of interoperability and collaboration.
 - Identify standard communication platforms and protocols, including those for communication with the public.

- b. Review and assess air monitoring assets including air contaminant modeling capability, meteorological forecasting, health and toxicological impact assessment, communication and collaborative resources.
 - Identify and assess meteorological and modeling resources, including the ability to obtain scenario models to support risk analysis and management in advance of incidents.
 - Identify and assess health hazard and risk assessment resources.
 - Brief local authorities on the Air Resources Board's capabilities.
- c. Engage the federal Interagency Modeling and Atmospheric Assessment Center or other qualified support agency, institution, or contractor to explore the possibility of designing and performing multi-scenario analyses of possible major air releases from refineries.
 - Establish site-specific model inputs.
 - Request multi-scenario plume models for major facilities.
- d. Evaluate suitable applications for tactical deployment of mobile and portable monitors during release emergencies.
 - Evaluate infrastructure/suitability of potential monitoring locations.
 - Determine best practices and procedures for deployment of monitors.
- e. Evaluate existing ambient air quality monitoring network enhancement opportunities including instruments, methods, siting and data gathering systems, and identifying the primary pollutants of concern.
 - Determine deficiencies in network, if any, with a focus on air emergency data collection.
 - Identify the most common chemicals monitored in an accidental refinery air contaminant release.
 - Review best practices/technology available with local air districts.
 - Develop jointly with local emergency response experts (including refinery personnel), recommendations to improve network capability for air emergency monitoring scenarios².
- f. Produce report to local emergency authorities on local air district findings and recommendations for emergency air monitoring program enhancements and potential available federal, State, or local funding sources for implementation of the recommendations.

3. Objective - Develop Statewide Guidance for Local Agencies

Responding agencies need to have clearly defined response protocols and procedures in place in the event of an accidental refinery release or similar disaster. Utilizing the expert assessment and recommendations in Objectives 1 and 2, the Air Resources Board and local air districts will develop guidance and best practices for responding to air emergency events. This objective is expected to be completed by June 2014.

² The Air Resources Board will utilize available studies, expert resources, and the United States Environmental Protection Agency's Emergency Response Air Monitoring Guidance Tables for establishing the full scope of pollutants of concern and meteorological parameters for purposes of this project.

- a. Gather local assessments and recommendations from local air district and refinery-specific evaluations.
 - Document response procedures and capability for each local responding agency and authority.
 - Identify opportunities to increase the degree of responding agencies' preparedness and education collaboration, including public communications.
 - Investigate the development of a State monitoring operations center to track refinery emissions and upsets, and other air monitoring parameters.
- b. Work with local districts and regional authorities to develop guidance for best practices.
 - Review policies created for regional response by the California Office of Emergency Services.
 - Develop guidance for appropriate emergency response policies.
 - Develop guidance for establishing air monitoring protocols that support the State's Incident Command System structure.
- c. Develop recommendations on creation or expansion of regional agreements involving local air districts, fire, safety, and public health officials to formalize support for emergency air monitoring responses.
 - Create a contact list for participating agencies.
 - Identify gaps in regional agreements and recommend solutions.
 - Identify benefits to proposed plan to local responders.
 - Present plan to local responders for review and support.
 - Work with the California Air Response Planning Alliance, California Air Pollution Control Officer's Association Air Monitoring Committee, and other organizations to formalize support for emergency response monitoring.
- d. Issue Statewide guidance document. Include as an appendix to the State Emergency's Annex for Oil Spills and Hazardous Materials - Emergency Function 10 (EF10).

4. Objective – Improve Interagency Coordination and Training Preparedness for Air Quality Emergencies

Development of a successful emergency air monitoring approach for public health protection must be done as a collaborative process with response agencies. The interagency approach emphasizes improved coordination and communication between existing organizations. The Air Resources Board will work with the California Air pollution Control Officers Association, affected local air districts and local emergency authorities on an ongoing basis to help improve readiness through appropriate best practices, education, training and exercises.

Training is a critical element of ongoing preparedness for any type of emergency. The State has a strong foundation in place for enhanced emergency air monitoring training in the California Air Response Planning Alliance, an informal collaboration created in 2007, by the Air Resources Board and the United States Environmental Protection Agency, to establish best practices, provide a technical information forum and conduct emergency monitoring training. The California Air Response Planning

Alliance is supported by the participation of several local air districts and should be a principal partner in fulfilling the ongoing demands of this objective.

This objective's program development tasks are expected to be completed by September 2014. The collaboration and communication tasks are ongoing.

- a. Work with organizations to improve awareness of emergency response requirements, best practices, exercise opportunities and training.
 - Involve the Certified Unified Program Agencies, California Air Pollution Control Officers Association, California Office of Emergency Services Emergency Function 10 coordinating group, and the California Air Response Planning Alliance.
 - Develop a continuing education program including presentations, training, evaluations, and exercises for emergency air monitoring preparedness and responses, including public communication.
 - Create training modules for emergency air monitoring.
 - Collect and distribute relevant media and reports on accidental releases for awareness and education purposes.
- b. Increase awareness of emerging needs and technical innovations through participation in state/national policy and technical video-conferences and webinars, and encourage publication of relevant studies or analyses on air monitoring practices and events.
- c. Develop and implement a system for the Air Resources Board to track improvements to the local emergency air monitoring and preparedness response systems on an ongoing, Statewide basis.
 - Obtain and review local air districts' annual monitoring network plans.
 - Obtain and review after-action reports and corrective plans from refinery emergency incidents.
 - Summarize relevant emergency air monitoring drills and exercises for inclusion in the California Environmental Protection Agency Emergency Response Management Committee annual report.
 - Utilize the California Air Response Planning Alliance and the California Air Pollution Control Officer's Association Air Monitoring Committee to assist with annual reviews and recommended updates.

VIII. Resources Needed

Execution of this Project Plan and the implementation of its recommendations require the commitment of resources. State agencies on the Interagency Working Group on Refinery Safety have been directed to dedicate appropriate resources to pursue refinery safety enhancements.

The Air Resources Board has committed the personnel resources needed to complete this Plan and support ongoing follow-up. The Air Resources Board will evaluate and make recommendations on the potential need for additional resources including

equipment, services (i.e., laboratory analyses, instrument leasing and operations, maintenance, and modeling and forecasting), and training to support local air emergency response programs. This is especially important when proposed enhancements require upgrades by the local air monitoring agencies. If early implementation is warranted in the execution of this Plan or of its recommendations, a higher priority for additional staffing or funding resources will be required.

The Air Resources Board will closely monitor federal, State, and local resource funding options through participation in the Interagency Working Group on Refinery Safety, and recommend viable resource options as they are identified.

IX. Conclusion

This Project Plan establishes a collaborative framework for the comprehensive identification, assessment, and improvement of State and local emergency air quality monitoring resources. It describes, through a clear set of objectives, how air monitoring information will be gathered and used to develop recommendations to local air districts and emergency response authorities. It also provides guidance and best practices for collaborative action that can be implemented on an ongoing basis. Summaries of these objectives and the expected outcomes are listed below.

- Delineating existing air monitoring assets and resources for each refinery will yield a comprehensive Statewide inventory of physical equipment, established services, and personnel dedicated to emergency air monitoring. The inventory will enable a comparative district-by-district and refinery-by-refinery assessment of capabilities. This information will be available through the online clearinghouse. The Air Resources Board is also investigating the feasibility of providing real-time video and emissions data. Making these resources easily accessible to emergency response officials and the public will enable more effective responses and improved public awareness.
- Evaluating air monitoring capabilities, and assessing gaps and potential enhancements will encompass a deeper assessment of local refinery emergency preparedness protocols and procedures. It will also enable development of recommendations to bring local air monitoring readiness into alignment with best practices and improved conformity with the Standardized Emergency Management System.
- Developing Statewide guidance through a comparative review of agency and industry-wide practices will enhance refinery air monitoring and encourage best practices. The Statewide guidance document will be designed to include a step-by-step process that local air monitoring agencies can use in the event of an accidental air contaminant release. The guidance document will be developed to allow adaptation to other types of major industrial releases beyond the refining industry.

- A plan for improved coordination and training will assure readiness to respond to air emergencies. Expected resource enhancements include regular training and greater interaction between air monitoring and emergency response officials, through established organizations, such as the California Unified Program Agencies Forum, the California Air Pollution Control Officer's Association, and the California Air Response Planning Alliance.

Because major air release incidents like the Chevron Richmond Fire can result in large releases of air contaminants over many jurisdictions of a major urbanized area, it is important that emergency planning officials understand and utilize the collaborative air monitoring tools and services at their disposal. This Plan provides a path forward to foster that understanding and to identify what additional resources may be needed to ensure public safety from the effects of accidental refinery releases and related disasters in the future.

X. List of Appendices

Appendix A Locations of California Refineries and Air Monitoring Stations with List of Acronyms

- A-1 Chevron-Richmond Refinery and Air Monitoring Station Map
- A-2 Phillips 66-Rodeo Refinery and Air Monitoring Station Map
- A-3 Valero-Benicia, Tesoro-Rodeo, Shell-Martinez Refineries and Air Monitoring Station Map
- A-4 Chevron-El Segundo, ExxonMobil-Torrance Refineries and Air Monitoring Station Map
- A-5 Phillips 66-Wilmington, Tesoro-Wilmington, Valero- Wilmington Refineries and Air Monitoring Station Map
- A-6 Tesoro-Carson, Paramount Petroleum- Paramount, Edgington-Long Beach Refineries and Air Monitoring Station Map
- A-7 San Joaquin Refining-Bakersfield, ALON-Bakersfield Refineries and Air Monitoring Station Map
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- A-9 Phillips 66-Santa Maria Refinery and Air Monitoring Station Map

Appendix B Project Plan Emergency Air Monitoring Points of Contact

Appendix C Air Resources Board Office of Emergency Response Program Capabilities and General Approach to Response

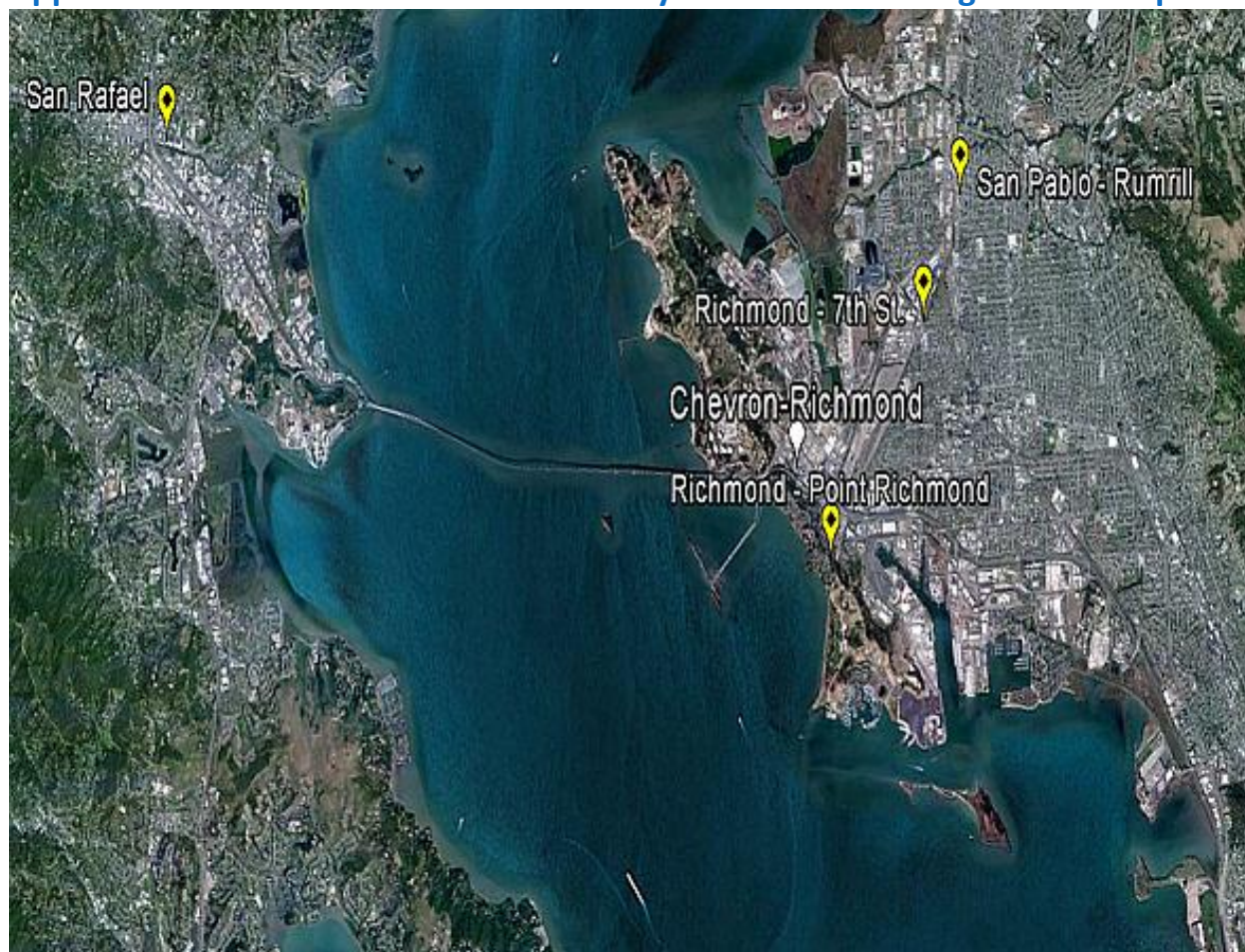
Appendix D Timeline for Project Plan Objectives and Tasks

Appendix A: Locations of California Refineries and Air Monitoring Stations

LIST OF ACRONYMS

O ₃	Ozone
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen, various
CO	Carbon monoxide
H ₂ S	Hydrogen sulfide
SO ₂	Sulfur dioxide
PM	Particulate matter
PM ₁₀ (mass)	PM <10 micrometers diameter, expressed as an actual weight per volume of air
PM ₁₀ (ions)	PM ₁₀ sampling with ability to analyze secondary components
PM _{2.5} (mass)	PM < 2.5 micrometers diameter, expressed as an actual weight per volume of air
BAM _{2.5}	PM _{2.5} by beta attenuation monitor
BAM ₁₀	PM ₁₀ beta attenuation monitor
PM _{2.5}	PM _{2.5} sampling with ability for chemical speciation
UFP _{0.1}	Ultrafine Particle < 0.1 micrometers diameter
TEOM	Tapered element oscillating microbalance, Analytical method for PM ₁₀ or PM _{2.5} .
PAHs	Polycyclic aromatic hydrocarbons, speciated organic fractions of PM ₁₀
NMHC	Non-methane hydrocarbons
NMOC	Non-methane organic compounds
PAMS	Photochemical assessment monitoring systems, a packaged monitor collecting measurements of O ₃ , NO _x , and targeted VOCs, including several carbonyls, and surface and upper air meteorology
Gas Organics	Speciated toxic organic compounds, using sample canisters
Metals	Speciated metals, using filter media
Aldehydes	Toxic aldehyde compounds, using filter media
Cr ₆₊	Toxic chromium, using filter media
Pb	Lead, using filter media
HWS	Horizontal wind speed
WD	Wind direction
OT	Outdoor temperature
RH	Relative humidity
BP	Barometric pressure
SR	Solar radiation

Appendix A-1: Chevron-Richmond Refinery and Air Monitoring Station Map



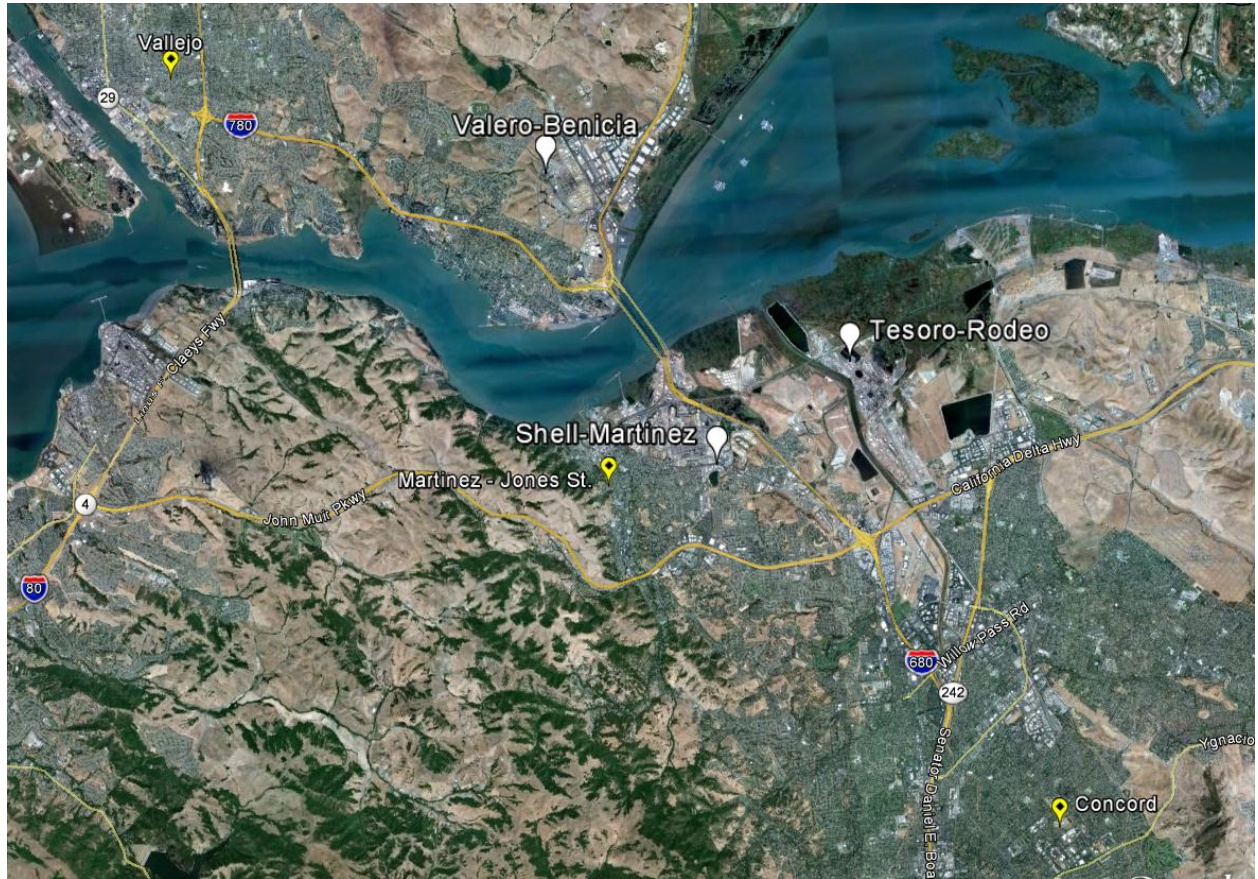
Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	UFP	Toxics	MET
San Rafael	O ₃ , NO ₂ , CO		PM ₁₀ (mass), PM ₁₀ (ions)	PM _{2.5} (mass)		Gas Organics	HWS, WD, OT
Richmond-Point Richmond	H ₂ S						
Richmond-7th Street	SO ₂ , H ₂ S					Gas Organics	
San Pablo-Rumrill	O ₃ , NO ₂ , CO, SO ₂		PM ₁₀ (mass), PM ₁₀ (ions)	BAM _{2.5}	PM _{0.1}	Gas Organics	

Appendix A-2: Phillips 66-Rodeo Refinery and Air Monitoring Station Map



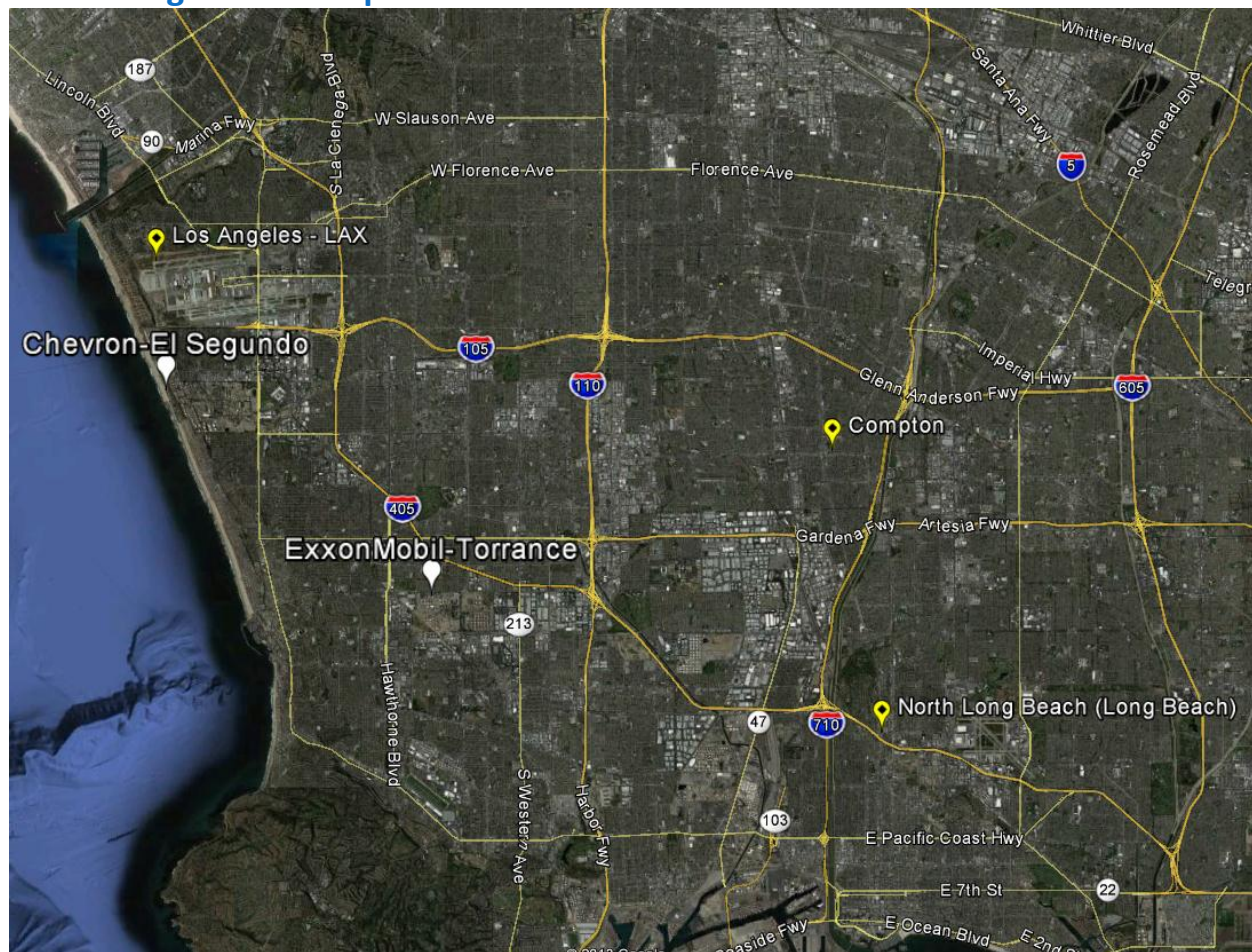
Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	TSP	Toxics	MET
Vallejo	O ₃ , NO ₂ , CO, SO ₂		PM ₁₀ (mass), PM ₁₀ (ions)	PM _{2.5} (mass), BAM _{2.5}		Gas Organics	HWS, WD, OT, RH
Rodeo-Third St	H ₂ S						
Crockett-Kendall Avenue	SO ₂					Gas Organics	

Appendix A-3: Valero-Benicia, Tesoro-Rodeo and Shell-Martinez Refineries and Air Monitoring Station Map



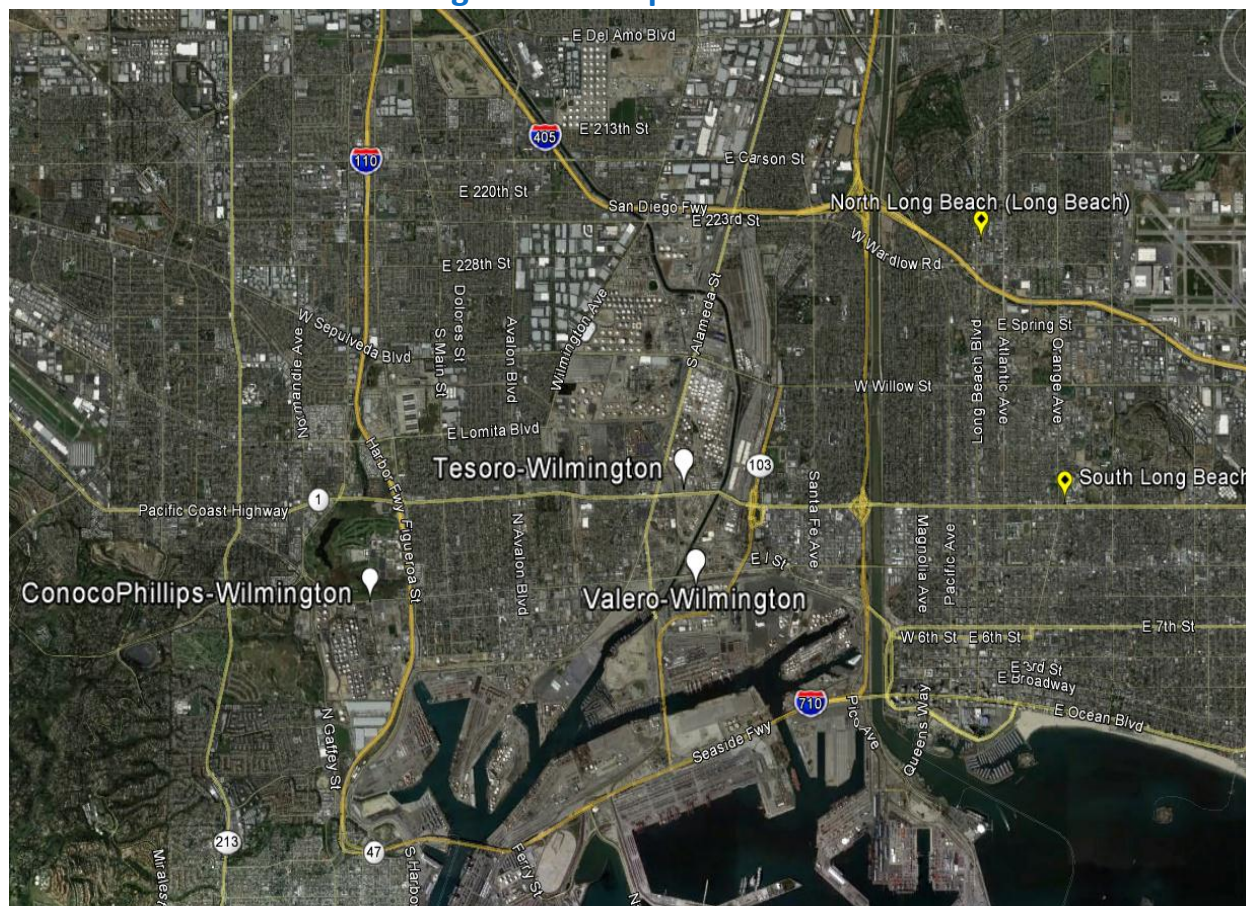
Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	TSP	Toxics	MET
Concord	O ₃ , NO ₂ , CO, SO ₂		PM ₁₀ (mass), PM ₁₀ (ions)	PM _{2.5} (mass)			HWS, WD, OT, RH
Martinez-Jones Street	SO ₂					Gas Organics	
Vallejo	O ₃ , NO ₂ , CO, SO ₂		PM ₁₀ (mass), PM ₁₀ (ions)	PM _{2.5} (mass), BAM _{2.5}		Gas Organics	HWS, WD, OT, RH

Appendix A-4: Chevron-El Segundo, ExxonMobil-Torrance Refineries and Air Monitoring Station Map



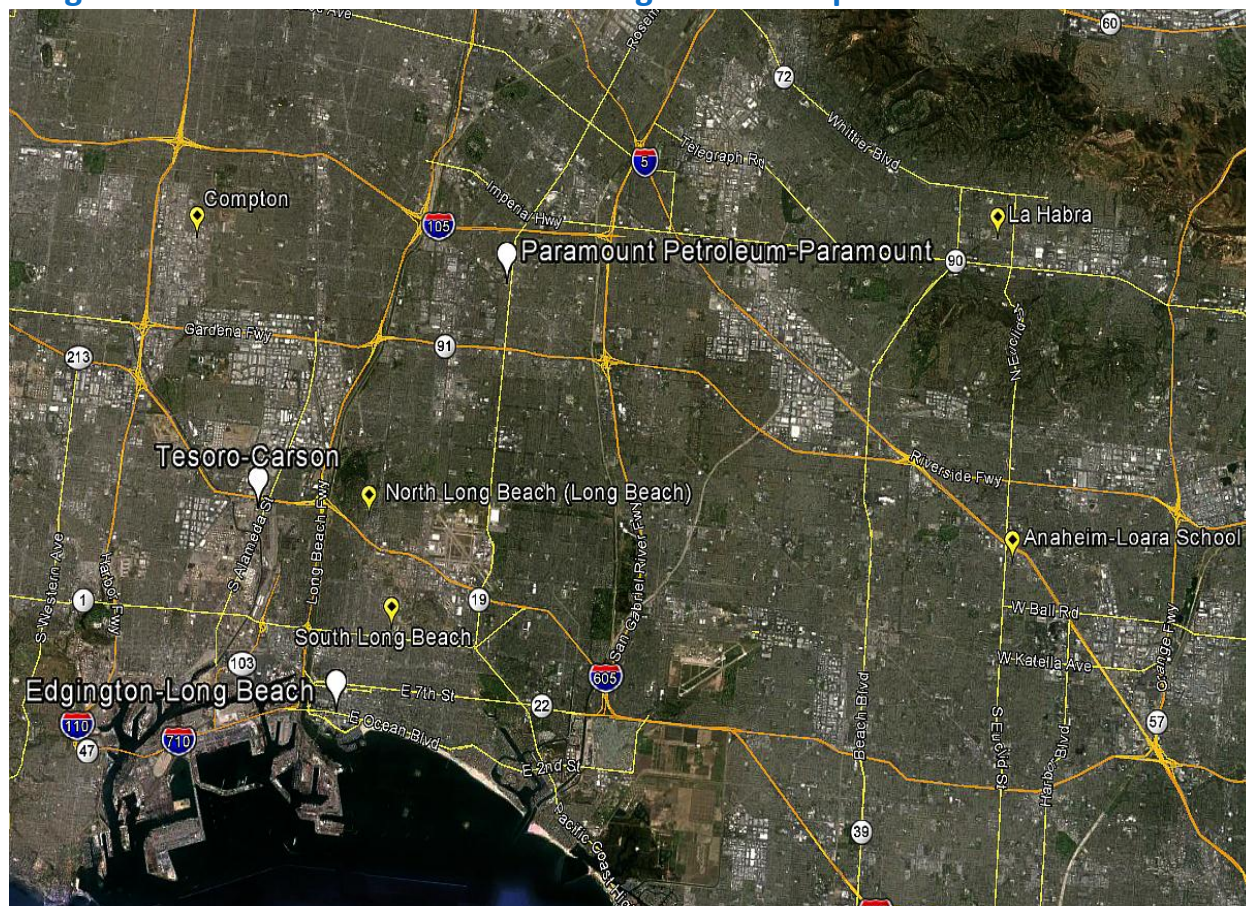
Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	TSP	Toxics	MET
Los Angeles - LAX	O ₃ , NO ₂ , CO, SO ₂		PM ₁₀ (mass)		Pb, SO ₄		HWS, WD, OT, BP, SR
Compton	O ₃ , NO ₂ , CO			PM _{2.5} (mass)	Pb		HWS, WD, OT, BP
North Long Beach (Long Beach)	O ₃ , NO ₂ , CO, SO ₂		PM ₁₀ (mass), PM ₁₀ (ions), PAHs, TEOM	PM ₁₀ (mass), PM _{2.5} (mass), PM _{2.5} (spec.), BAM _{2.5}	Pb, SO ₄	Gas Organics, Metals, Aldehydes, CR ₆₊	HWS, WD, OT, RH, BP, SR

Appendix A-5: Phillips 66-Wilmington, Tesoro-Wilmington, Valero-Wilmington Refineries and Air Monitoring Station Map



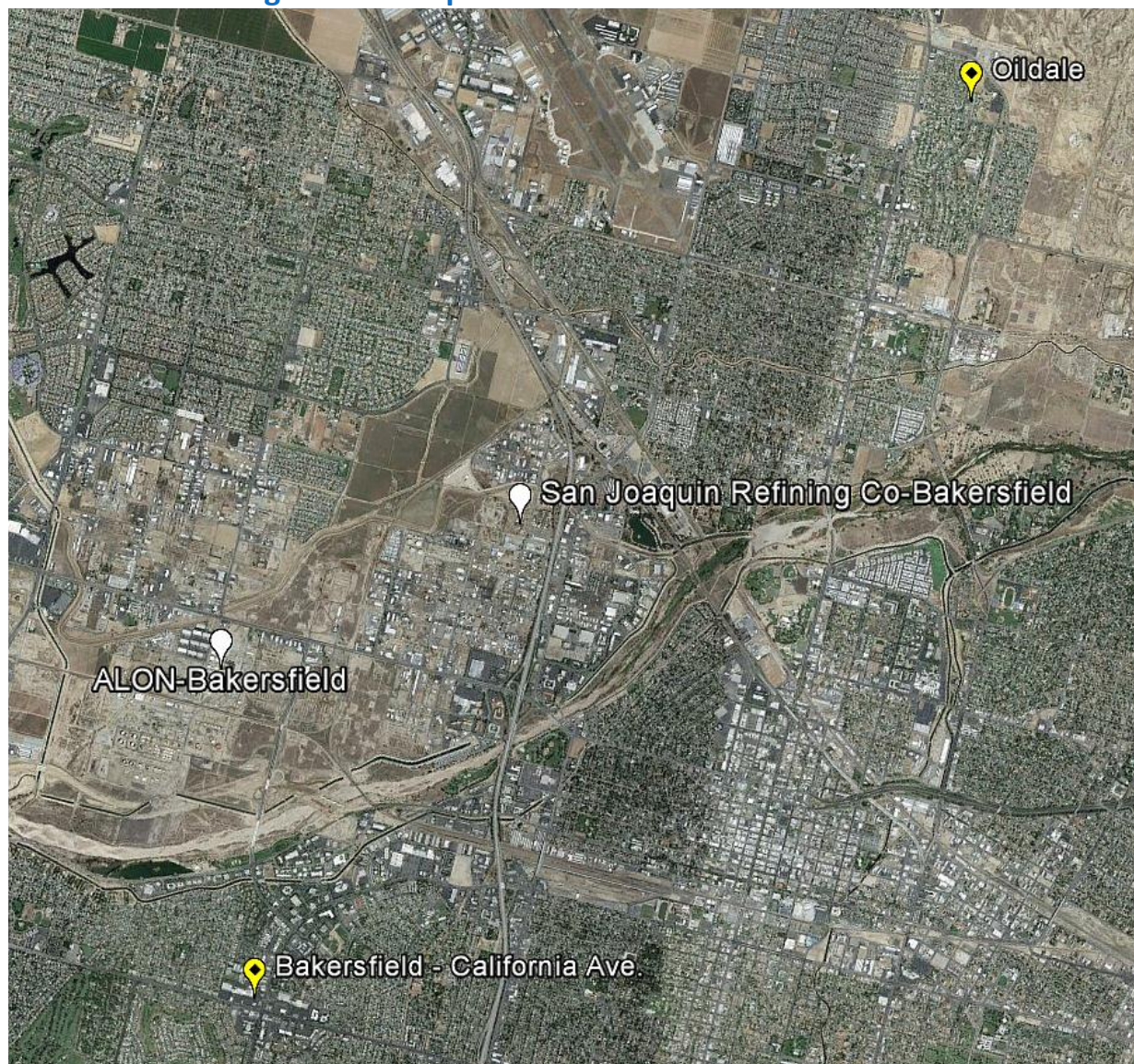
Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	TSP	Toxics	MET
North Long Beach (Long Beach)	O ₃ , NO ₂ , CO, SO ₂		PM ₁₀ (mass), PM ₁₀ (ions), PAHs, TEOM	PM _{2.5} (mass), PM _{2.5} (spec.), BAM _{2.5}	Pb, SO ₄	Metals, Aldehydes, CR ₆₊	HWS, WD, OT, RH, BP, SR
South Long Beach			PM ₁₀ (mass)	PM _{2.5} (mass)	Pb, SO ₄		HWS, WD, OT, BP

Appendix A-6: Tesoro-Carson, Paramount Petroleum-Paramount, Edgington-Long Beach Refineries and Air Monitoring Station Map



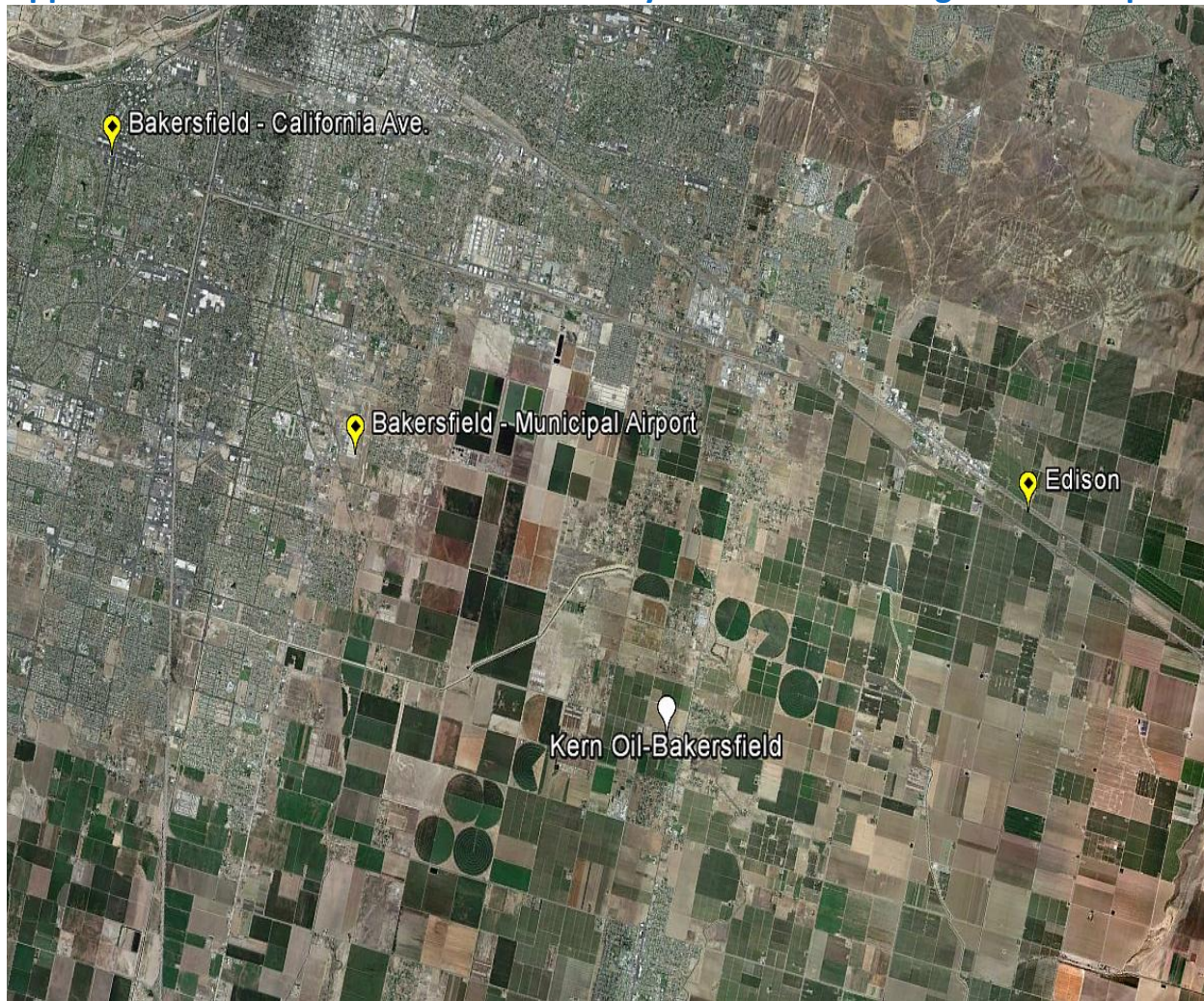
Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	TSP	Toxics	MET
North Long Beach (Long Beach)	O ₃ , NO ₂ , CO, SO ₂		PM ₁₀ (mass), PM ₁₀ (ions), PAHs, TEOM	PM _{2.5} (mass), PM _{2.5} (spec.), BAM _{2.5}	Pb, SO ₄	Gas Organics, Metals, Aldehydes, CR ₆₊	HWS, WD, OT, RH, BP, SR
Compton	O ₃ , NO ₂ , CO			PM _{2.5} (mass)	Pb		HWS, WD, OT, BP
South Long Beach			PM ₁₀ (mass)	PM _{2.5} (mass)	Pb, SO ₄		HWS, WD, OT, BP
Anaheim-Loara School	O ₃ , NO ₂ , CO		PM ₁₀ (mass), PM ₁₀ (ions), BAM ₁₀	PM _{2.5} (mass), PM _{2.5} (spec.), BAM _{2.5}			HWS, WD, OT, BP
La Habra	O ₃ , NO ₂ , CO						HWS, WD

Appendix A-7: San Joaquin Refining-Bakersfield, ALON-Bakersfield Refineries and Air Monitoring Station Map



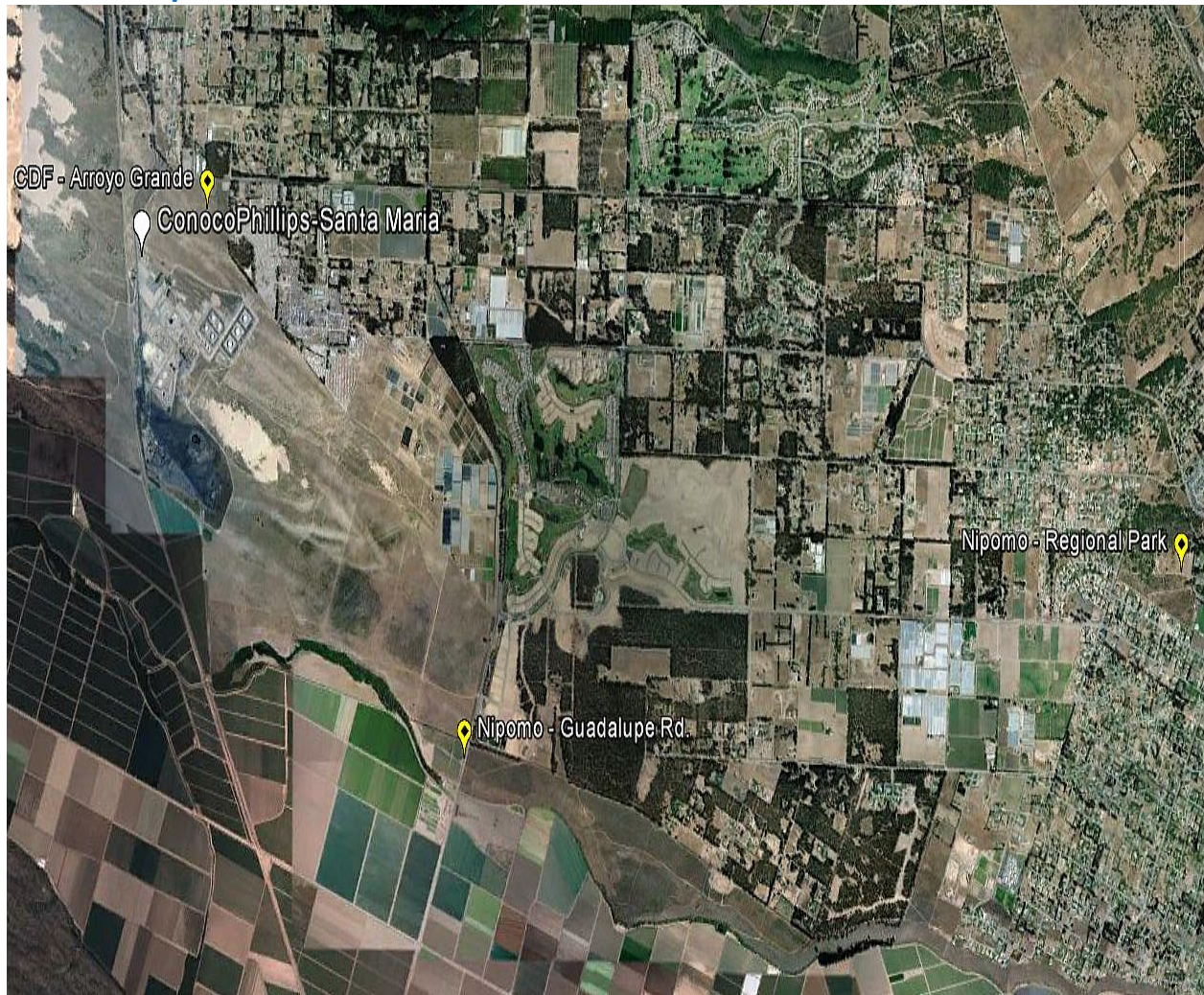
Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	TSP	Toxics	MET
Oildale	O ₃		PM ₁₀ (mass), PM ₁₀ (ions)				HWS, WD, OT
Bakersfield-California Avenue	O ₃ , NO ₂		PM ₁₀ (mass), PM ₁₀ (ions)	PM _{2.5} (mass), PM _{2.5} (spec.), BAM _{2.5}		Gas Organics, Metals, Aldehydes, CR ₆₊	HWS, WD, OT, RH, BP, SR

Appendix A-8: Kern Oil-Bakersfield Refinery and Air Monitoring Station Map



Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	TSP	Toxics	MET
Bakersfield – Municipal Airport	O ₃ , NO ₂ , CO	NMHC, NMOC, PAMS	PM ₁₀ (mass)	PM _{2.5} (mass), BAM _{2.5}			HWS, WD, OT, RH, BP, SR
Bakersfield-California Avenue	O ₃ , NO ₂		PM ₁₀ (mass), PM ₁₀ (ions)	PM _{2.5} (mass), PM _{2.5} (spec.), BAM _{2.5}		Gas Organics, Metals, Aldehydes, CR ₆₊	HWS, WD, OT, RH, BP, SR
Edison	O ₃ , NO ₂						HWS, WD, OT

Appendix A-9: Phillips 66-Santa Maria Refinery and Air Monitoring Station Map



Site Name	Criteria Pollutants	Non-Criteria Pollutants	PM ₁₀	PM _{2.5}	TSP	Toxics	MET
Nipomo - Regional Park	O ₃ , NO ₂		BAM ₁₀				HWS, WD, OT
CDF - Arroyo Grande			BAM ₁₀	BAM _{2.5}			HWS, WD
Nipomo-Guadalupe Road	SO ₂		BAM ₁₀	BAM _{2.5}			HWS, WD, OT

Appendix B: Project Plan Emergency Air Monitoring Points of Contact

Agency	Name	Title	Contact Information	Address
Bay Area AQMD	Eric Stevenson	Director of Technical Services	415-749-4695 estevenson@baaqmd.gov	939 Ellis Street San Francisco CA 94109
South Coast AQMD	Philip Fine	Assistant Deputy Executive Officer	909-396-2239 pfine@aqmd.gov	21865 E. Copley Dr. Diamond Bar CA 91765
	Jason Low	Atmospheric Measurements Manager	310-233-2269 jlow@aqmd.gov	
San Joaquin Valley Unified APCD	Samir Sheikh	Director of Strategies and Incentives	559-230-6000 samir.sheik@valleyair.org	1990 E. Gettysburg Ave. Fresno, CA 93726
	Michael Carrera	Compliance Manager	559-230-6000 michael.carrera@valleyair.org	
San Luis Obispo APCD	Karen Brooks	Compliance and Monitoring Manager	805-781-5912 kbrooks@co.slo.ca.us	3433 Roberto Court San Luis Obispo CA 93401
ARB	Greg Vlasek	Chief, Office of Emergency Response	916-323-4294 gvlasek@arb.c.agov	1927 13 th Street Sacramento CA 85811
Cal/EPA	Jim Bohon	Assistant Secretary, CUPA and Emergency Response	916-327-5097 james.bohon@calepa.ca.gov	1001 I Street Sacramento CA 95814
U.S. EPA Region IX	John Kennedy	Emergency Response Program Manager	415-947-4129 kennedy.john@epa.gov	75 Hawthorne Street San Francisco, CA 94105

Appendix C: Air Resources Board Office of Emergency Response Program Capabilities and General Approach to Response

Mission Statement

The Office of Emergency Response protects public health from acute exposure to the hazards of major, unplanned air contaminant releases and other emergencies with air quality impacts. The office maintains and improves preparedness for providing accurate, timely and actionable air pollution measurements, forecasts and advisories on an emergency basis, and collaborates with other emergency response entities for optimum technical and operational effectiveness.

Background

The Air Resources Board formally established its emergency response program within a separate office in late 2009. Formation of the program fulfills mandates of the California Emergency Services Act, several administrative orders, executive orders, and the 2009 revision to the California State Emergency Plan. In response to these mandates, the Office of Emergency Response directs the Air Resources Board's support of local air districts, local public health and environmental health departments and other agencies during air quality emergency events. The group also coordinates with State and federal agencies on Statewide training and preparation for major air releases.

The Office of Emergency Response deploys quick-response air monitoring instruments and resources during air contamination emergencies, plans and directs the support functions of the Board-wide Emergency Response Team, and oversees the Air Resources Board's participation in Agency-wide and Statewide emergency air monitoring preparedness activities.

As dictated by need, the group collaborates with expert staff from: 1) the Monitoring and Laboratory Division (for instrument support and analytical services), 2) Air Quality Planning and Science Division (for meteorology, atmospheric modeling and emission inventory functions), 3) Research Division (for health risk assessment) and 4) the Chairman's Office of Public Affairs (for public communication and advisories).

The Chief of Emergency Response acts as the Air Resources Board's representative to the California Environmental Protection Agency's Emergency Response Management Committee that coordinates emergency management planning, communications, training, response, and recovery efforts across all boards, departments and offices under the direction of the Assistant Secretary for Emergency Response and Local Programs.

Appendix C (continued) Air Resources Board Office of Emergency Response Program Capabilities and General Approach to Response

General Approach to Response

The Office of Emergency Response develops and maintains internal response protocols within the fundamental framework of the Standardized Emergency Management System and its formal Incident Command System, making response actions and procedures congruent with regional, state, and national response actions.

Activation

Activation of emergency services is typically initiated by a local air district or health department request for assistance. This may occur directly or by issuance of a Standardized Emergency Management System-compliant formal mission task through the California Office of Emergency Services State Warning Center. The Office of Emergency Response responds as quickly and directly as possible in either situation. Because State policies may limit the scope and duration of responses without a State Warning Center mission task, the Office of Emergency Response always encourages local requesters to obtain one. This step can usually be completed within the time required for the emergency response team to prepare for deployment.

In some cases, the Office of Emergency Response learns of an emergency before receiving notice from the local authority or the State Warning Center. In those cases, the group “leans forward” to initiate notification and preliminary air contamination assessment of the incident. The extent and nature of a response is based on an assessment of the problem using all available information.

Scope of Response

The Office of Emergency Response provides air contamination measurement, assessments and forecasts either remotely or on-scene, depending on circumstances and need and maintains a condition of active preparedness. This includes ensuring equipment is maintained in a cold standby mode so it can be operated properly without delay. Emergency response units also have the responsibility of investigating means, methods, and techniques to meet our mission more effectively. The group maintains active training and preparedness, with simulations and practical exercises, within and among the emergency response units to ensure effective deployment of the Air Resources Board’s resources and assets. Table 1 summarizes the services provided. Table 2 at the end of this appendix describes the alert levels that the Office of Emergency Response has established for response readiness and the functional unit responsible for each task.

Appendix C (continued) Air Resources Board Office of Emergency Response Program Capabilities and General Approach to Response

Table 1 - Summary of Services

Response Support	Assessment and Measurement
Remote: <ul style="list-style-type: none"> • Data Review • Meteorological forecasting • Plume dispersion modeling • Toxicology research • Health assessment • Monitor placement assistance • Health advisory support 	Remote: <ul style="list-style-type: none"> • Meteorological conditions • Air quality data (fixed sites) • Federal Data Access
On-site: All the above, plus: <ul style="list-style-type: none"> • Detailed situational assessment, including classified and sensitive intelligence • Incident Command System support (air monitoring operations) 	On-site: All the above, plus: <ul style="list-style-type: none"> • Detailed situational assessment • On-site sampling/monitoring for pollutants of concern • Portable and handheld analyzers • Remote instrument connectivity • Re-entry and re-occupation assessment

Capabilities

The Office of Emergency Response is prepared to respond to many types of industrial, commercial and natural incidents. Staff is proficient in analyzing and performing on-site determinations during incidents such as breakdowns, fires, and chemical spills. The group also relies on the expertise and cooperation of other organizations for detection and surveillance of chemical, biological, or radiological agents released in a community.

Measurement

The Office of Emergency Response operates instruments and employs assessment techniques that emphasize real-time (hourly average) data and assessments that address current conditions that support command decisions regarding public health. The emergency response team increases value by making available up-to-date and easily accessible data. Real time data are preferred whenever possible.

Field samples that require transport to a lab for analyses are processed and results made available as expeditiously as possible. Quality control procedures for sampling and analysis are employed to validate data coincident with its collection/analyses to expedite availability and ensure reliability.

The Office of Emergency Response performs on-site air measurements both as transient surveys to help map the extent of the problem, and at fixed locations in the community to assess impacts over time.

Appendix C (continued) Air Resources Board Office of Emergency Response Program Capabilities and General Approach to Response

Field Meteorology

The Office of Emergency Response deploys portable, self-contained, meteorological stations with wind speed, wind direction, humidity, radiation, and temperature sensors. Satellite-linked transmitters send data collected hourly to internet access points. The emergency response team also has real time on-site weather stations capable of automatically updating local chemical plume modeling software via radio transmission.

Portable Air Sampling and Analysis

For community based monitoring in populated areas in the general vicinity of an incident, the Office of Emergency Response deploys an array of air samplers and analyzers including a combination of hand-held and radio transmitting devices. Portable instruments are capable of detecting a wide range of particulate matter and volatile organic compound gas families. The radio-enabled instruments allow responders to safely monitor data from a remote area away from chemical and fire hot zones. Several of the units are configured to network with other responding agencies sensors to increase the network size. The team also uses two different types of particulate matter samplers for deployments to monitor wildfire smoke and contaminated dusts.

Atmospheric Modeling

The Office of Emergency Response produces gas and particulate plume models using real-time, on-site meteorological sensors and data collected from existing fixed and deployable monitoring networks. Models commonly used among emergency responders include ALOHA, HYSPLIT, and a 3-dimensional Interagency Modeling and Atmospheric Assessment Center model that incorporates portable measurements to enhance the accuracy of plume projections in real time.

Meteorological Support Services

The Emergency Response Team staff meteorologists identify historical, current, and forecast meteorological conditions that can be used to help predict impacts to a community or responders during emergency air releases. Staff experts generate meteorological inputs for producing contaminant plume trajectory models.

Laboratory Services

The Monitoring and Laboratory Division's Northern Laboratory Branch provides analytical services as needed for gaseous and particulate samples collected on various media and contracts for supplemental analytical services for chemical assessments. The emergency response group also has access to services from other State agency (e.g., Department of Toxic Substances Control and the California Department of Public Health) and contract laboratories.

Appendix C (continued) Air Resources Board Office of Emergency Response Program Capabilities and General Approach to Response

Health Assessment & Consultation

The Office of Emergency Response's staff emergency health assessment specialist provides interpretation of health implications of air quality monitoring and modeling results, in collaboration with contacts at the California Office of Environmental Health Hazard Assessment and the California Department of Public Health. Consultation is available remotely or, if warranted, on-scene at the emergency.

Appendix C (continued) Air Resources Board Office of Emergency Response Program Capabilities and General Approach to Response

Table 2 - Alert Level Status and Standard Preparedness Guide

Activation Level	Unit Roles	Task
Level 4, Monthly Maintenance Mode. The default level, ensuring preparedness for future deployment.	Field Surveillance	Check air emergency response related equipment, systems, procedures, training, computers, staffing, hardware and software tools, communications devices and network connectivity. (Monthly)
	Field Surveillance	Review and update any leases or contracts. (Monthly)
	Field Surveillance	Review certification dates of personal protective equipment, consumables, lamps, cartridges, tubes; check all batteries for electronics. (Monthly)
	Field Surveillance	Review and update vehicle serviceability - oil/gas, batteries, tire pressure, engine, generators, wiper blades, fluid levels. (Monthly)
	Field Surveillance	Locate all equipment components. (Monthly)
	Coordinator	Review staff roster. Consider staff support - shifts and rotation of staff. (Monthly)
	Field Surveillance	Review operational procedures, update as needed. (Monthly)
	Coordinator	Review past improvements and changes. (Monthly)
	Field Surveillance	Review job assignments if deployed. (Monthly)
	Coordinator	Ensure all staff, including backup unit leads, are sufficiently trained. (Monthly)
	Field Surveillance	Review and update software and bookmarks. (Monthly)
	Field Surveillance	Review and test all internet links, wireless access cards, and wired connectivity. (Monthly)
	Modeling	Run test simulation of emergency plume models (CAMEO™, HYSPLIT™). (Quarterly)
	Meteorology	Run test of graphic displays useful for emergency response (wind roses, surface plots, wind fields). (Quarterly)
Level 3, Awareness. This level indicates we have been made aware there is an incident generally by the State Warning Center or Cal/EPA.	Coordinator	Inform staff/supervisor of activation status.
	Coordinator	Identify staffing needs if activated, including shift work.
	Field Surveillance	Review Unit Approach to Response documents.
	Field Surveillance	Review transportation options.
	Field Surveillance	Develop preliminary transportation plan for field assets and staff.
	Coordinator, Monitoring	Locate and review primary assets. Ensure they are functioning and ready for deployment.
	Field Surveillance, Monitoring	Review, identify, and locate supporting assets (calibration gases, batteries, phones, computers, radios, personal protective equipment, maps, safety equipment, vehicle needs).
	Field Surveillance	Inform coordinator (via e-mail or phone) when Level 4 readiness has been met.
	Coordinator	Evaluate best option to respond if requested.

Appendix C (continued) Air Resources Board Office of Emergency Response Program Capabilities and General Approach to Response

Table 2 - Alert Level Status and Standard Preparedness Guide (continued)

Level 2, Deployment Likely. This level suggests imminent deployment is likely. All units will be placed on this Alert Level.	Field Surveillance	Identify specific travel options (air reservations, vehicles) if necessary.
	Field Surveillance, Monitoring	Collect, box up, and load specific primary and support field assets.
	Modeling, Meteorology	Laboratory to review current capacity to analyze samples, turn around time for lab data, and prioritize workload to accommodate emergency samples.
	Meteorology, Modeling, Health	Review and identify appropriate assessment tools for office-based staff.
	Coordinator	Contact those who provide technical information necessary for job completion.
	Field Surveillance	Test connectivity, access to internet resources, and software functionality.
	Coordinator	Review possible postings via email or WebEOC™.
	Monitoring	Review availability of sampling media for network air toxics in affected area. Develop accelerated schedule.
	Coordinator	Contact other units to discuss needs, products, timing, and any logistical issues.
	Modeling, Meteorology	Gather information necessary to perform initial tasks (models, trajectories, forecasts, current conditions, emission rates) to facilitate siting assets.
	Monitoring	Identify nearby meteorological and monitoring resources and determine what additional sampling resources may be needed if high frequency sampling is necessary.
	Field Surveillance, Monitoring	Contact coordinator directly (via e-mail or phone) when Level 3 readiness has been met, and include possible time of departure and estimated time of arrival for field assets.
	Field Surveillance	Either Lead or Back-up remain available by phone or e-mail.
	Coordinator	Contact local agencies.
	Coordinator	Open new incident folder via email or WebEOC™.
Level 1, Deployment Mode. This is the order to deploy and execute tasks. This may apply to individual units or the team as a whole.	Coordinator	As directed, deploy assets.
	Meteorology, Modeling, Health	Be prepared to be requested to accompany coordinator to the field. Coordinator will notify staff as early as possible if office staff are needed on-site.
	Field Surveillance	Provide deployment information to coordinator directly. Create incident folder entry via email or WebEOC™.
	Field Surveillance	Conduct assessments for siting assets.
	Meteorology, Modeling	Conduct screening runs and suggest general areas to site meteorological monitoring (via email or WebEOC™).
	Health	Identify sites of interest (evacuation centers, hospitals, population centers).
	Coordinator	Work with response teams and locals to make final site selection.
	Monitoring	Discuss with coordinator initiating high frequency intermittent sampling for relevant pollutants (toxic gases, metals, particulate matter) at network sites.
	Coordinator	Via email or WebEOC™, enter initial posting.
	Coordinator	Review email or WebEOC™ postings for questions or specific needs.
	Coordinator	As conditions change, update assigned tasks (per written procedures) and post updates via email or WebEOC™.

Appendix D: Timeline for Project Plan Objectives and Tasks

		2nd Quarter 2013			3rd Quarter 2013			4th Quarter 2013			1st Quarter 2014			2nd Quarter 2014			3rd Quarter 2014			4th Quarter 2014		
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Objective 1																						
a	Summarize state and local ambient air monitoring network information.																					
b	Identify key local stakeholders and assets for emergency response.																					
c	Develop mechanisms to monitor and communicate refinery safety information to emergency officials and the public (i.e., create website, investigate feasibility of video cameras and particulate monitors).			Ongoing																		
d	Conduct review of existing air monitoring capabilities of local emergency authorities.																					
Objective 2																						
a	Evaluate applicable protocols and procedures for emergency response.																					
b	Review and assess meteorological forecasting, health and toxicological impact assessment, mutual aid, communication and collaborative resources.																					
c	Engage the Federal Interagency Modeling and Atmospheric Assessment Center to design and perform multi-scenario analyses of possible major air releases from industrial facilities, to assist with future modeling and make monitor placement decisions more effective.																					
d	Evaluate suitable applications for tactical deployment of mobile and portable monitors during release emergencies.																					
e	Identify and evaluate monitoring network enhancement opportunities including instruments, siting and data gathering systems.																					
f	Develop final report to local emergency authorities on local district findings and recommendations for emergency air monitoring program enhancements.																					
Objective 3																						
a	Gather local assessments from air district and refinery-specific evaluations.																					
b	Work with local/regional stakeholders to develop broad protocols/guidance document for best practices.																					
c	Promote expansion of network agreements between local air districts, safety and public health officials to formalize support for emergency air monitoring responses.																					
d	Issue guidance document.																					
Objective 4																						
a	Work with organizations to maintain awareness of emergency response requirements, best practices, exercise opportunities and training.																					
b	Increase awareness of emerging needs and technical innovations through participation in state/national policy and technical video-conferences and webinars.																					
c	Develop and implement a system for the Air Resources Board to track local improvements to the emergency air monitoring and preparedness response system on an ongoing, statewide basis.																					

 = completed
  = projected